Architecting the Network

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ISOC Workshop

Architecture and Design

- Definition of Architectural Principles
- Translating Architecture into a Design
- Generating an Engineering Plan
- Implementing the Network
- Operational Considerations
- Policy Considerations

Personal Experience

The Australian Internet - AARNet

- Constructed in May 1990
- Initially 45 client sites (to 450)
- Modest implementation budget
  (initially $US 1.2M)
- Modest initial staff resources (2)
- June 95: $10M p.a. with 5 staff

Personal Experience

Telstra Internet

- purchased AARNet operations and customer base
- commenced July 95
- telco National Internet Backbone and provider
- June 97: $80M p.a. carriage business

Architectural Principles

Assumption:

- Implementation of Public Infrastructure on a National Scope

Design issues will vary for commercial and/or corporate networks

Architectural Principles

- Simplicity
- Functional Adequacy
- Affordability
- Implementable today
- Designed to meet actual end client requirements
- Uses (and develops) local expertise

Architectural Principles

Simplicity is the key attribute of any network architecture

Diverse, complex and uncoordinated architectures result in very high implementation and operational costs, and are resistant to subsequent incremental engineering.

Architectural Principles

Functional adequacy means doing what is required

but NOT doing what is unnecessary or what is not needed

Maintin focus on solving the objectives of the network's service goals

Architectural Principles

Affordability means keeping the network within the bounds of available funding

If you can't pay for it you'll never be allowed to build it!

Start small and allow for incremental growth

Architectural Principles

Implementable means using components which are seen to work well

Don’t build a production network using experimental hardware and software!

Architectural Principles

Create a service which solves your client's actual needs

Try not to solve artificial requirements!

Architectural Principles

Be inclusive with involvement

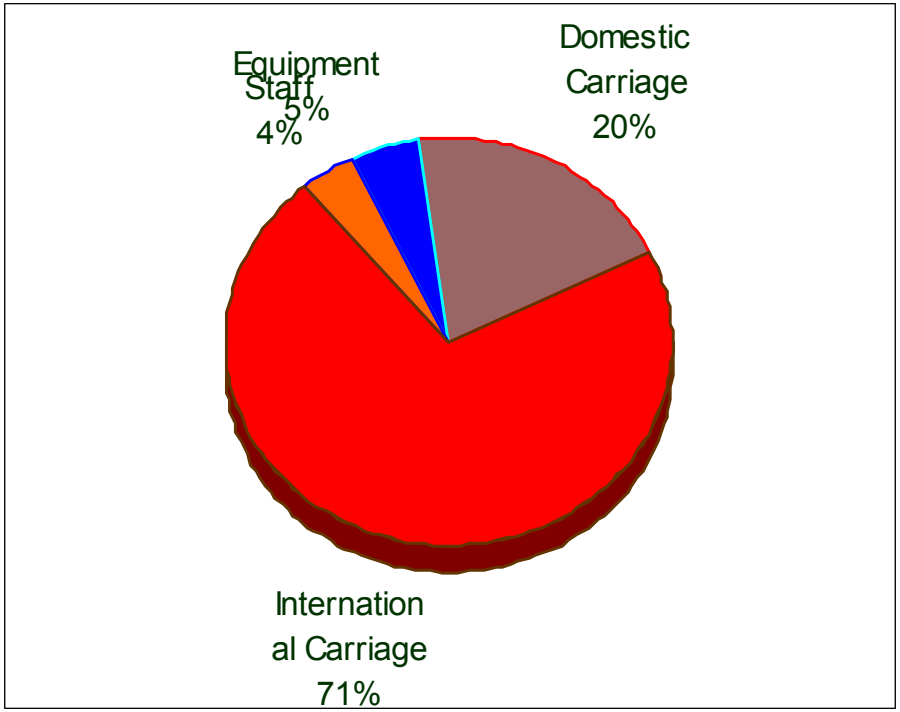
A national network will need the efforts of many individuals to make it happen

Allow folk to get involved, and share the responsibility of making it happen

Network Design Considerations

- Design objective is to minimise costs and maximise capability
- Unless you are a telco bandwidth lease will dominate all other cost elements

  even then it will probably dominate all other costs!
- The unit cost of bandwidth is the major design parameter



Network Design Considerations

- Implementation and operational cost
- Network performance
- Operational reliability
- Manageability
- Extensibility

Network Design Strategy

- Affordable capacity defines delivered service quality
- Solve today's problems first
- Define a service which matches current needs before matching future expectations

Network Design Components

- Internet Transport Service Core
  - Leased circuits
  - Routers
  - Routing Design

Network Design Components

- Access Services
  - Router ports
  - Modems and ISDN dynamic access ports
  - Customer Interface definition

Network Design Components

- Application Service Elements

  Servers and Services:

  - DNS
  - USENET
  - EMAIL
  - WWW
  - FTP
  - WEB PROXIES and CACHES

Network Design

Network Operational Management

Network Accounting